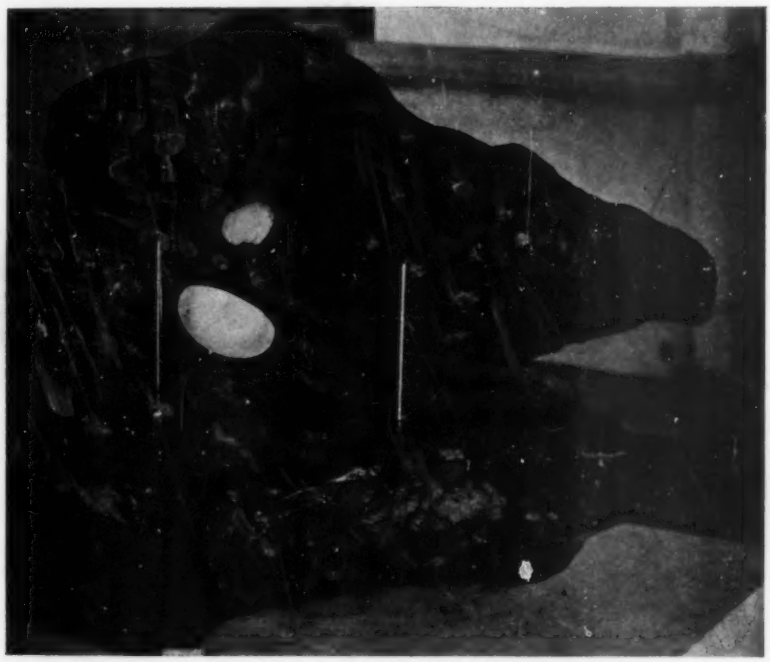
THE AMERICAN MUSEUM JOURNAL



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Annual Members	$ 10	Fellows	$ 500
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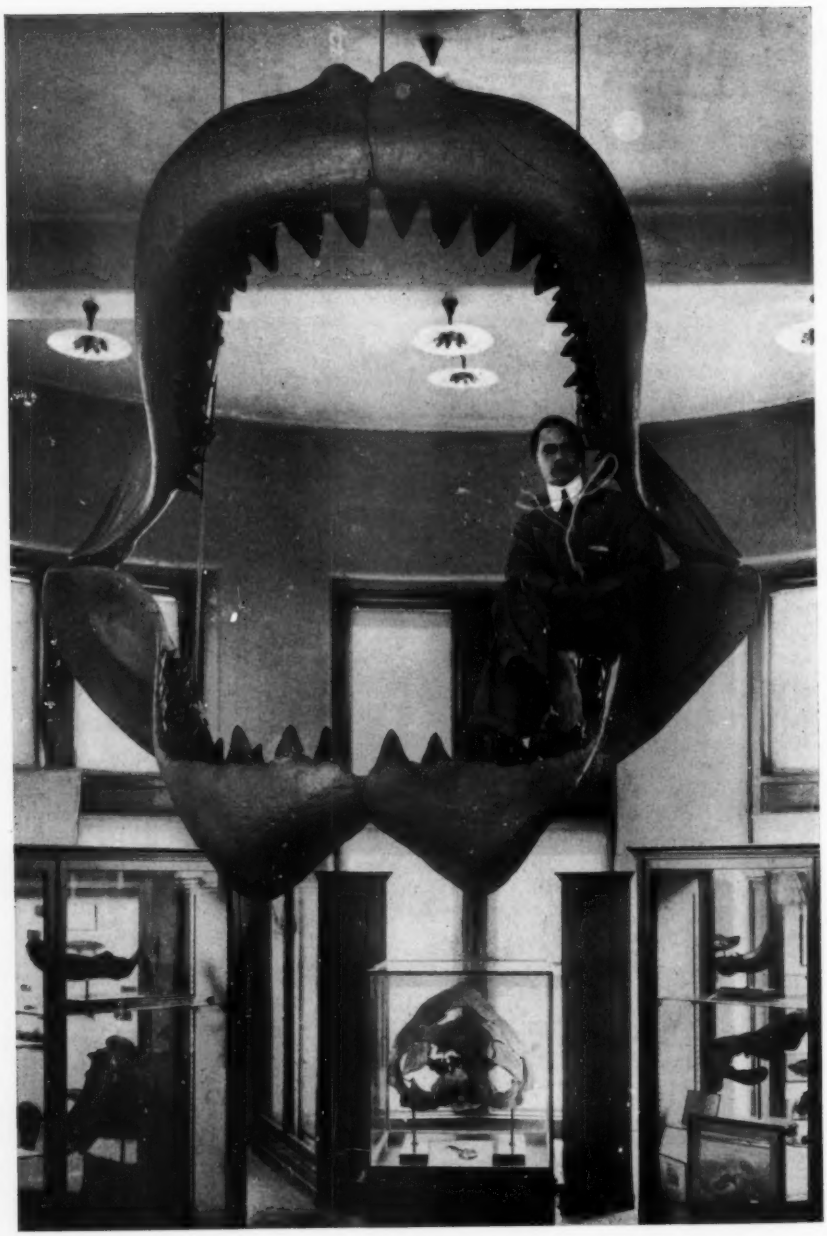


RESTORATION OF THE JAWS OF THE FOSSIL SHARK, CARCHARODON MEGALODON.

The American Museum Journal

VOL. IX DECEMBER, 1909 No. 8

THE GIANT OF ANCIENT SHARKS.

AT the entrance of the Hall of Fossil Fishes there is now exhibited a restoration of the jaws of a shark (*Carcharodon megalodon*) which lived along the coast of South Carolina, in Tertiary time. There can be no doubt that this was the largest and most formidable fish living or extinct of which we have any record. The jaws of a fully grown specimen measured about nine feet across and must have had a gape of five or six feet. The teeth themselves average about six inches in height in the middle of the jaw, and they gradually decrease in size in the direction of the sides of the mouth, the smallest teeth measuring about two inches.

In the present restoration the teeth have been arranged as in the living species of Carcharodon, the great White Shark or Man-Eater, for there can be no question that the fossil shark differed in no essential structure from its modern relative. Accordingly the jaws of *Carcharodon rondeleti* were carefully measured (a splendid pair having been loaned by the Museum of Natural History of Paris, through the courtesy of Professor Valliant), and the model was prepared according to scale, that is, in accordance with the proportions of the teeth in the extinct and in the living form. The fossil teeth were then arranged on the jaws in the same number of rows and in the same number of banks of graded sizes. Fortunately for this purpose a large assortment of teeth of the fossil shark was available, out of which an almost complete dentition was selected. This material had been collected during many years by a resident of Charleston, Joseph Cohen, and the collection was secured through a grant from the Cleveland H. Dodge fund.

The accompanying picture gives an idea of the impressive size of the ancient Carcharodon. Indeed from the teeth alone one can form a reasonably accurate estimate of the dimensions of the fossil fish, for it is known that a specimen of the living species in which the largest tooth was one and one half inches in height measured twenty feet, and that another having teeth three inches in height had a total length of forty feet. It therefore follows that the length of the Carolina shark whose

teeth measured six inches was approximately eighty feet, an estimate, by the way, which was made many years ago by Professor Goode. The largest living shark is the Whale Shark, *Rhinodon* which probably does not exceed fifty feet in length.

In spite of its great size, Carcharodon appears to have been quite common in its day, judging at least from the number of teeth found in the deposits of phosphate. And from this fact one may form an idea of the richness of the marine fish fauna of that time. For where there existed one of these sharks there must have been a vast number of fishes of the usual bony-fish type, for sharks are proverbially rapacious, and we can estimate fairly that the daily provisioning of so huge a creature implies the capturing of tons of bony-fishes. This is worthy of mention also, because it gives us a striking illustration of the imperfection of the geological record. It is a well-known fact that in regions where the teeth of this shark are plentiful, there occur few fossils of the common kinds of fishes. Even the most fragmentary remains of bony-fishes (teleosts) are usually lacking. It is none the less clear from the very presence of the sharks that a contemporary fish-fauna must have been represented in the most abundant way.

BASHFORD DEAN.

EXPERIMENTAL WORK WITH POMACE FLIES.

EXPERIMENTAL studies in evolution are important not only for their theoretical interest, but also because it is believed that the principles worked out in the lowest forms of life will apply also to domestic animals and plants and even to man.

It is the natural course of scientific progress for verbal description and speculation to be followed by mathematical statement and experimental analysis. Certain experiments were made even before Darwin's time and a large part of Darwin's own work was experimental; but the painstaking studies of de Vries concerning the origin of plant species, together with the recognition of Mendel's Laws of Heredity, not only have given an impetus to experimental evolution, but also, in a large measure, have determined the character of the work. As a consequence, research by pedigree breeding for de Vriesian "mutations" and the

testing of the manner of inheritance have been energetically carried on during the past few years and have yielded many interesting results. Other factors of evolution, such as the effect of environment, the laws of fluctuating variation, and selection, have also been studied quantitatively and experimentally, although to a less extent.

In these experiments it is important to know the characters of both the ancestors of the individuals used and of their progeny. Pedigreed cultures must be made. Therefore, it is desirable to use some rapidly breeding form which can be easily reared. Domestic animals and insects have been favorite zoölogical material, and among the latter the common red-eyed Pomace Fly (*Drosophila ampelophila*), also known as the Vinegar Fly, Sour Fly and Fruit Fly, has been found to be an excellent laboratory creature. It feeds upon fermenting vegetable matter. At ordinary room temperature a generation can be obtained every two weeks. The eggs are laid directly upon the food (*e. g.* ripe banana)

Fig. 1.

FIG. 1. FORE LEG OF A MALE POMACE FLY, DROSOPHILA AMPELOPHILA.

and hatch in two or three days into legless larvæ, or maggots, which pupate after about a week of feeding. The pupal period is four or five days long, and in a trifle over twenty-four hours after emergence from the pupal case the adults mate and a new generation is started. The adults live, on the average, three weeks or a month and the female may lay as many as three hundred eggs.

The males differ from the females very strikingly in the adult stage. They are somewhat smaller and the under side of the abdomen is more completely pigmented. The most interesting difference, however, is the possession by the males of a relatively large comb-like structure, upon the anterior legs (see Fig. 1). This is a secondary sexual character that is as pronounced as the antlers of deer. It would be explained by many, since no other function is apparent, as a male adornment which is pleasing to the female. However, I have found that the males from which the "sex combs" have been removed are just as successful in

getting mates as those which possess it, although strong evidence of sexual selection with respect to other characters is being obtained.

It is generally believed that close inbreeding is always attended by decreased vitality and disuse by degeneration. This is not the case with *Drosophila ampelophila*. It has been repeatedly bred for a large number of generations, mating brother and sister, without disastrous results. I have, furthermore, made careful measurements of the wings of successive generations and found that although my pedigreed stock has not been allowed to fly for more than fifty generations, there has been no degeneration of the wing either as to size or as to venation. On the other hand, by selective breeding I have been able to get specimens with greatly reduced wing venation as is shown in Figure 2, Figure 3 showing the normal wing. Selection in the other direction, *i. e.*, for increased venation, is just as effective (Fig. 4). A study of the inheritance of these variations was begun at the Station for Experimental Evolution of the Carnegie Institution and is being continued, with other mathematical and experimental studies of evolution, at the Museum. About 200,000 pedigreed individuals of this species alone have already been obtained. The interpretation of the results of this work is complicated by the fact that the two sexes display the abnormalities to unequal degrees and also because the mode of inheritance deviates strongly from expectation on the basis of the commonly accepted laws.

Fig. 2.

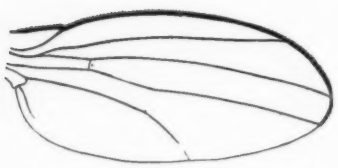


Fig. 3.

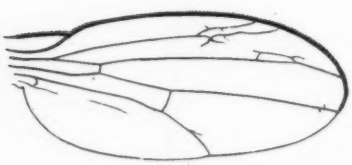


Fig. 4.

FIG. 2. A WING OF DROSOPHILA AMPELOPHILA SHOWING REDUCTION OF VENATION DUE TO SELECTION.

FIG. 3. A NORMAL WING OF DROSOPHILA AMPELOPHILA.

FIG. 4. A WING OF DROSOPHILA AMPELOPHILA SHOWING INCREASE OF VENATION DUE TO SELECTION.

F. E. LUTZ.

THE GUFFEY, COLORADO, METEORITE.

IN November, 1907, two cowboys, Robert L. Pope of Canyon City, Colorado, and J. T. Witcher of Guffey, Park Co., Colorado, discovered an iron meteorite while they were riding after their cattle along the head waters of the Freshwater River. The exact location of the find is the N. E. ¼ of the N. E. ¼ of Section 16, Township 35, Range 72, 6th Principal Meridian, W. in Freemont County, Colorado. The nearest post office is Guffey, Park County, about three and one half miles from the spot where the iron was found. The cowboys secured help and at last succeeded in getting the mass out of the mountains and to Cripple Creek. The American Museum purchased it from the finders, and it is now on exhibition in the foyer.

Guffey, as it must be called from the name of the post office nearest to the spot where it was found, is a "siderite," or wholly metallic meteorite 36½ inches long, 15 inches in maximum height and 8 inches wide. Its weight is 682 pounds. The mass is roughly pear-shaped, but much flattened. One edge is so straight and is so nearly rectangular with reference to the adjoining sides that it seems like a definite fracture, indicating the possibility of there being another fragment or other fragments of the meteorite in the vicinity of the spot where this was found. The surface of the iron is covered with an extremely thin film of black iron oxide, which looks as if it might be the original skin formed by the passage of the meteorite through the air. At any rate, the iron is free from rusty scale and apparently had not lain long upon the mountain before it was found. The statement is made that a vivid meteor passed over the Freshwater River region in the fall of 1906, and the supposition is that this mass is a part of it. The evidence, however, is not strong in support of this theory. The cowboys who found the iron were not searching for a meteorite, and in fact did not know that they had found one. The brilliant white color disclosed on rubbing the surface led them to suppose that they had found a mass of pure silver, and they started to get it to town accordingly, after making an unsuccessful effort to cut off the small end of the specimen.

Two sides show in good development the "thumb marks" or "piëzoglyphs" characteristic of meteoritic masses. These markings are particularly deep upon the flat side shown in Figure 2, and they are less

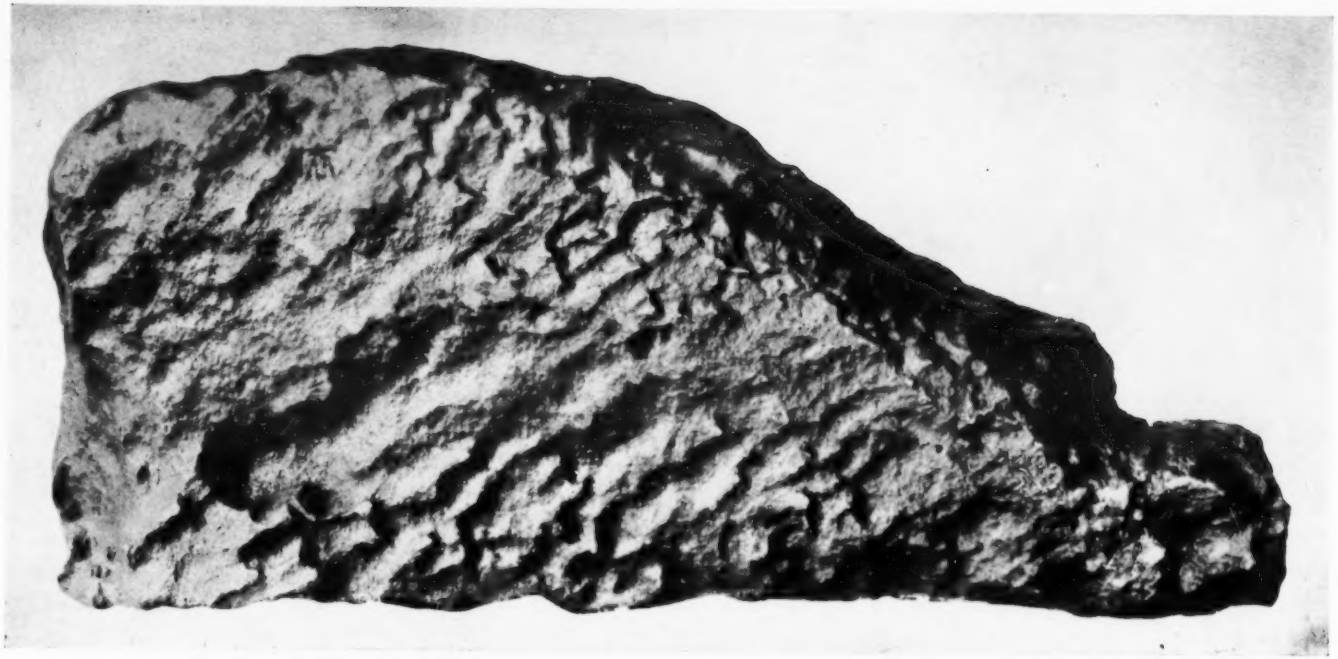


FIG. 1. GUFFEY METEORITE. FRONT, OR "BRUSTSEITE".

Shows furrows and subconical pits due to flowage as a result of superficial melting produced by friction with the air. These furrows and points indicate that the meteorite passed through the air with this side and the upper right hand end in front most of the time.

FIG. 2. GUFFEY METEORITE. REAR SIDE, PROTECTED DURING ITS JOURNEY THROUGH THE AIR.

The depressions called thumb-marks or piëzoglyphs, which usually cover the surface of a meteorite, are strongly developed on this side of the mass.

FIG. 3. GUFFEY METEORITE. UPPER EDGE OF MASS AS EXHIBITED.

The upper left hand portion of this edge probably was in front during most of the meteorite's flight through the air. The surface is indented with numerous thumb-marks and flow furrows.

FIG. 4. GUFFEY METEORITE. LOWER EDGE OF MASS AS EXHIBITED.

Showing the straight, almost rectangular relation of this surface to its neighbors, which indicates a probable fracture of the original mass, while in the air. Piëzoglyphs, or thumb marks, are poorly developed on this surface.

pronounced and somewhat more elongated in the round edge shown in Figure 3. The flat side shown in Figure 1 has comparatively few round piëzoglyphs, but it has many pits, grooves and points due to the flowing of the melting surface of the mass during flight through the atmosphere. The almost square edge, which is illustrated in Figure 4 and which is considered to be an abrupt fracture occurring when the meteorite was near the end of its atmospheric flight, has an oxidized skin like the rest of the mass but shows piëzoglyphs very imperfectly.

Figure 1 shows the side which was in front during most of the meteorite's atmospheric flight and is called by the Germans the "brustseite." The position of the furrows indicates that the line of flight was toward the upper right hand quarter of the mass as shown in this picture. Although the iron is unusually uniform and dense in structure, as will be brought out under the discussion of its composition, it evidently yielded unequally to the heat produced by friction with the atmosphere, and the air in passing over its surface plowed deep furrows ending in subconical pits and left sharp projections pointing forward in the direction of flight.

A piece of the iron which had been sawed from the small end of the mass was polished and etched with dilute nitric acid at the Museum and was afterwards polished again and treated with dilute and strong nitric acid and picric acid in succession by the chemists, Booth, Garrett and Blair, Philadelphia, picric acid proving to be the best mordant. The surface does not show the Widmanstätten lines usually characteristic of meteoritic iron, but instead it possesses an extremely fine granular crystalline structure, which is shown magnified 100 diameters in Figure 5 from a photomicrograph made by the analysts. The homogeneous character of the mass and the paucity of nonmetallic contents are indicated by the high specific gravity. The chemical analysis, made by Booth, Garrett and Blair, resulted as follows:

FIG. 5. GUFFEY METEORITE. PHOTOMICROGRAPH.

Polished section magnified 100 diameters to show cryptocrystalline structure.

Iron	88.687%
Nickel	10.547%
Cobalt	0.546%
Chromium	0.018%
Manganese	none
Carbon	0.025%
Silicon	none
Sulphur	0.016%
Phosphorus	0.020%
Total	99.859%

Specific gravity, 7.939.

This analysis shows that the Guffey meteorite contains rather more than the average percentage of nickel and cobalt and unusually low percentages of carbon, sulphur and phosphorus. The extremely small amount of sulphur found indicates the practical absence from the mass of troilite, the protosulphide of iron which is found only in meteorites. This inference is substantiated by the few particles of this mineral which are to be seen on careful examination of the surface. The low content of phosphorus might have been inferred from the practical absence of schreibersite (a phosphide of nickel and iron characteristic of meteorites) as shown by the polished and etched specimen, this mineral being the substance that usually brings the Widmanstätten lines out in relief.

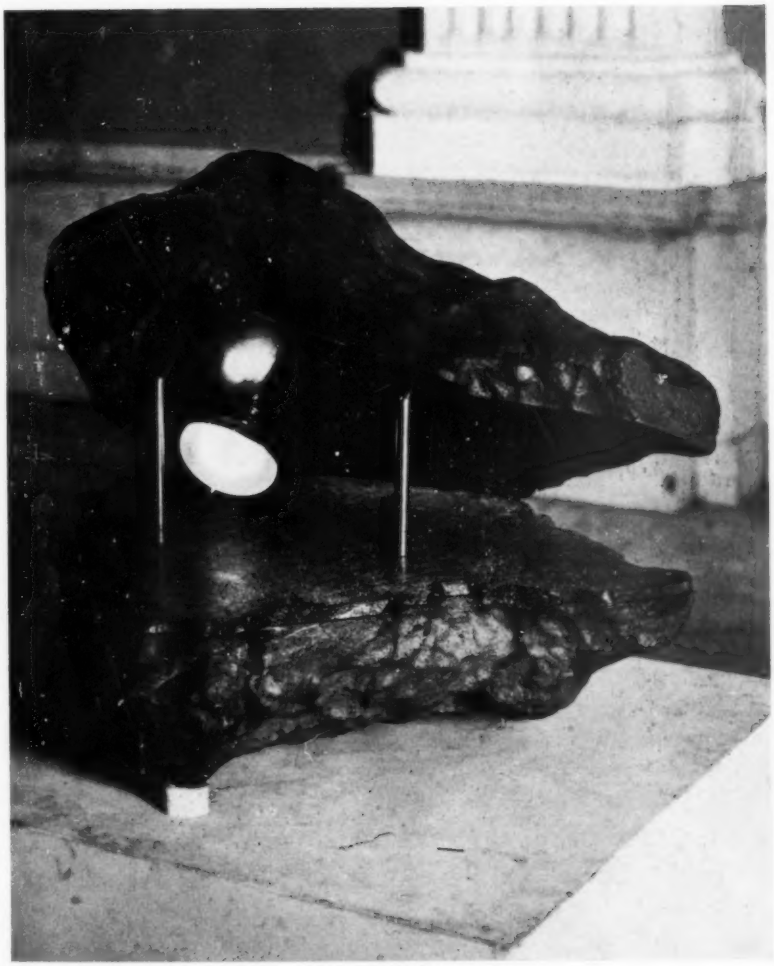
EDMUND OTIS HOVEY.

RECENT ADDITIONS TO THE METEORITES IN THE FOYER.

DURING the past summer three important accessions were installed among the meteorites in the Foyer. They were (1) the newly discovered iron known as Guffey which is described elsewhere in this issue of the JOURNAL, (2) a slice and cast of the iron meteorite called Gibeon and (3) the largest known portion, weighing 20 pounds 3 ounces, of the stone meteorite Modoc.

The manner of installing the Gibeon section is a new departure in the mounting of meteorites, as far as we know. About two years ago we received through exchange with the Natural History Museum of Hamburg, Germany, a plaster cast of the larger of the two known por-

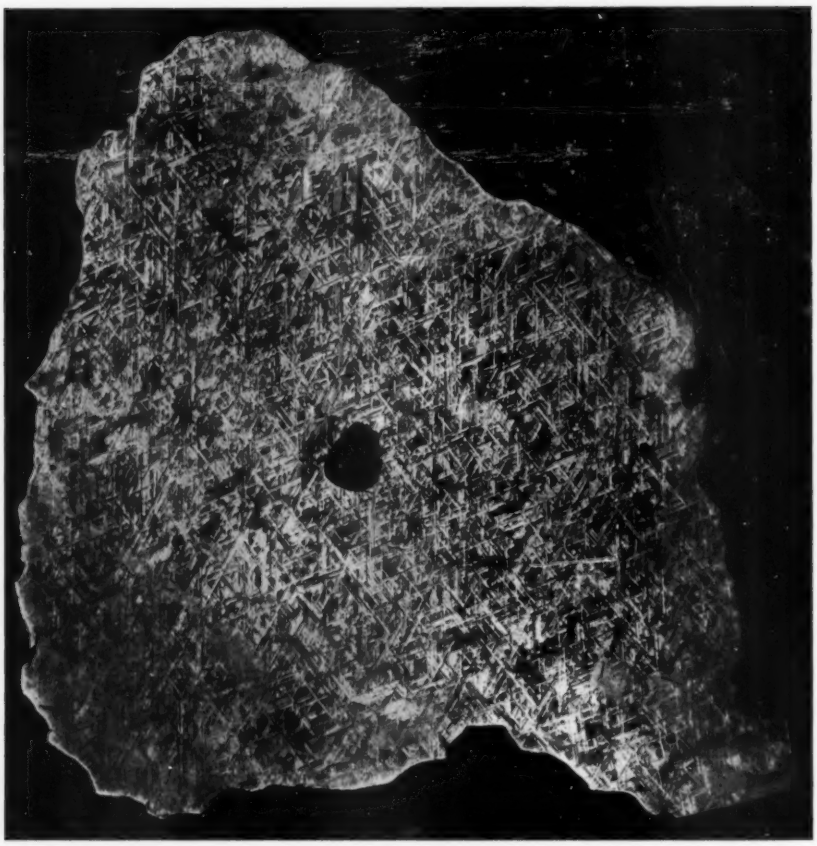
GIBEON IRON METEORITE. GENERAL VIEW



GIBEON IRON METEORITE. GREAT NAMAQUA LAND, AFRICA.

Cast iron reproduction with etched slice of original in its proper position. The electric light has been inserted in order to display clearly the "Widmanstätten lines" that show the crystalline character of meteoritic iron and the lack of such lines in artificial iron.

tions of this interesting find, together with a polished and etched slice giving a complete section of the mass in its greatest dimensions and showing in remarkably beautiful development the Widmanstätten lines that are generally characteristic of meteoritic iron. The original mass weighed 562 pounds. We determined the correct position of the slice in



GIBEON IRON METEORITE. POLISHED AND ETCHED SECTION.

One fourth natural size.

the plaster cast, cut the latter in two and fitted the slice into its proper place. Then we had each portion of the plaster cast reproduced in cast iron, and hinged the two parts together, with the natural section in its original position, thus showing not only the appearance of the mass

as found but also its internal crystalline structure. We also polished the opposing surface of the cast iron reproduction and treated it with dilute nitric acid in the same manner as the meteorite itself had been treated, in order to bring out the fact that artificial iron does not possess the crystalline structure which is so characteristic of the other. A natural depression fortunately pierced the upper half of our cast and gave us an ideal way of introducing an electric light to enable visitors to see clearly the Widmanstätten lines of the meteorite and the amorphous character of the cast iron.

The meteorite takes its name from the little village of Gibeon whose geographical position is about 25° 8′ South latitude and 17° 50′ East longitude in the eastern part of Great Namaqua Land, in German southwest Africa, the home of the Hottentot. Two other famous iron meteorites have been found within a radius of 125 miles of Gibeon: Mukerop, of which there is a fine slice in the Ward-Coonley collection of meteorites, now in our Hall of Geology, and Lion River, which came from near the hamlet of Bethany and is represented by a small part of a slice in our general series. The latter has been known for more than half a century, having been described by Prof. C. U. Shepard in 1856. The former has come to public notice more recently. It resembles Gibeon in crystalline structure so closely that some authorities have been inclined to consider them parts of the same fall. Lion River, however, is entirely distinct in character.

Modoc is an aërolite or stony meteorite that was seen to fall near the town of Modoc, Scott County, Kansas, and the occurrence is described by Mr. J. K. Freed, an eyewitness of the fall and the finder of our specimen, as follows:

"The meteorite appeared as a ball of fire in the west September 2, 1905, at 10 o'clock in the evening, the sky being cloudless and the clear atmosphere of the plains being undisturbed by wind. From Scott City to Syracuse, 75 miles southwest, it was light enough to read common newspaper print on the street and the explosions rattled doors and windows. The mass exploded, and then the resulting fragments exploded several times in rapid succession. The fragments gleamed brightly at first but their light went out almost immediately after the explosions. Then came the sounds of the explosions, the whistling like bullets or heavy hail of the smaller fragments and a most intense humming like that of a rapidly revolving cylinder of some heavy machine, evidently caused by the larger mass. This was followed by

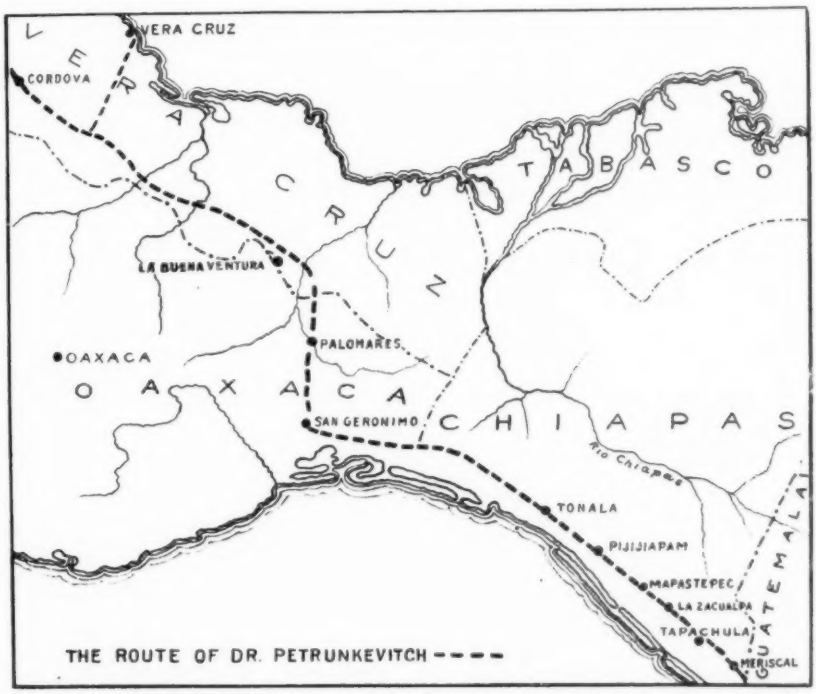
fierce cannonading (echoes of the explosions?) like the discharge of a battery of artillery or a rapid-fire machine gun, gradually growing fainter and dying out like rolling thunder in the distance. The first explosion took place about 40 miles west of the fall and fully as far above the surface of the earth. The fragments were scattered over an area nine miles by three; the largest ones going farthest. I heard the largest one drop and hunted for it for over two years.

"On May 6, 1908, I was breaking new ground on the prairie with a gang-plow and a five horse team that was a little too high-spirited to be controlled easily, but having half-mile furrows as smooth as a lawn before me, I had set the plow a few notches deeper into the ground and let them go, thinking nothing of meteorites. While congratulating myself upon our speed we suddenly — very suddenly — struck something hard. It threw me out of my seat and piled my gang-plow up in a promiscuous heap against the team, which was too badly surprised to do anything. I had plowed hundreds of acres and knew there was not a rock within ten miles of me, so my first thoughts were of dynamite. After sitting for some time trying to think, I ventured back to where my plow had left the ground. Seeing nothing, I commenced stabbing with my jack-knife and soon located the cause of the disturbance. It was the largest fragment of the Modoc meteorite and completely buried under the tough buffalo sod (virgin soil) and was pounded in so hard that the force of the blow of my gang-plow had not loosened it. So completely was it buried, that I had hunted dozens of times all over that pasture without either finding the rock or the hole in the ground which it had made."

Twenty-five fragments of Modoc have been found. All are covered with the thin glassy black coating or "skin" that is generally characteristic of aërolites and that is caused by the melting of the surface in the great heat generated by friction with the air during flight through the earth's atmosphere. Flakes broken off by the plow reveal the interior of the mass and show that the meteorite is composed of whitish stony material like some terrestrial lavas, but containing bright specks of metallic iron.

A TRIP TO SOUTHERN MEXICO FOR SPIDERS.

WHEN I found in June, 1909, that I was to visit southern Mexico to collect spiders, I anticipated the trip with great interest since only a few species of spiders had been described from the States of Vera Cruz and Tabasco, while Chiapas remained entirely unexplored. From the geography of the country we should expect to find a continuation of the Central American coast fauna along the

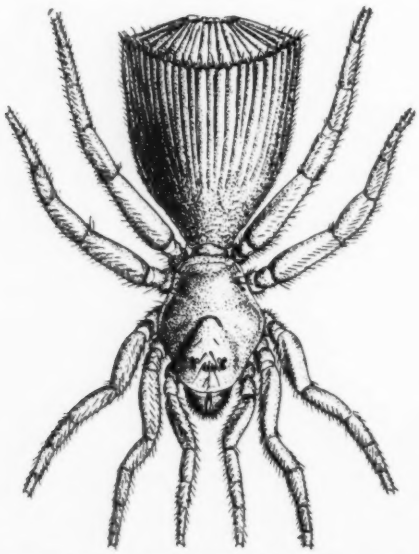


MAP OF SOUTHEASTERN MEXICO SHOWING REGION VISITED BY DR. PETRUNKEVITCH.

Pacific coast of Chiapas. On the other hand, the fauna of the lowlands of Tabasco, Campeche and Yucatan shows some relation to the West Indian fauna, which itself has close relation to the fauna of Venezuela. Thus a study of the fauna of Central America is a clue to the understanding of the insular fauna which represents remarkable features in the West Indies.

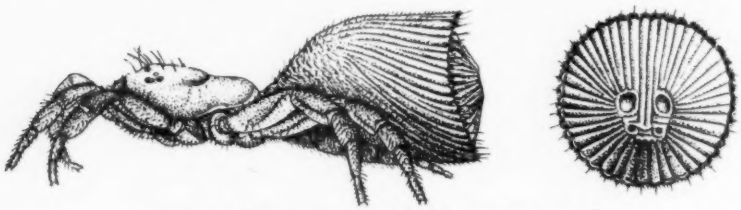
I left New York July 1 by the Ward Line of steamers and landed

at Vera Cruz, July 9. The sky was cloudless, and vegetation showed all signs of prolonged drought. During the day the breeze from the sea was refreshing, but each evening this died away leaving the night hot and uncomfortable. After two days at Vera Cruz, I went south on the Vera Cruz al Isthmo Railroad, passing alternately through savannas of mesquite and palms and extensive, beautiful jungles. Leaving the train at the Santa Rosa flag station on the Isthmus of Tehuantepec, an hour's ride brought me to the rubber plantation La Buena Ventura, where it was my good fortune to experience for ten days the hospitality of Mr. J. C. Harvey, one of the owners. Mr. Harvey has extensive knowledge of tropical plant and animal life and is a specialist on palms and orchids. His house is surrounded by a veritable botanical garden of trees and other plants from all parts of the world, while the plantation itself is picturesquely shut in by the jungle.



TRAP-DOOR SPIDER CHORIZOPS LORICATUS.

But one other specimen is known.



TRAP-DOOR SPIDER, CHORIZOPS LORICATUS.

Side view. Enlarged.

End of abdomen, used as the "trap-door."

Judging from foot-prints, the locality was a good one for hunting jaguar, tapir, wild swine and deer, but I was intent on smaller game. In the depth of the jungle, there is little life on the ground. Along the

trails, however, and at the edge of the woods are great numbers of butterflies and grasshoppers and many species of other insects. During two days, one species of butterfly was migrating high over the jungle in immense numbers. I found two large tarantulas common. There was found also and presented to me by Mr. E. Howard, a specimen of a very rare trap-door spider, *Chorizops loricatus* C. K. There is only one other specimen of this spider known to exist, and that is in the Paris collection.

After leaving La Buena Ventura, I spent four days at Palomares in

E. O. Hovey, Ph.o.o, 1906.

SANTA LUCRECIA. A NATIVE VILLAGE ON THE ISTHMUS OF TEHUANTEPEC.

the State of Oaxaca on the Isthmus. Here there is also an extensive jungle, but the character of the vegetation is somewhat different, owing to different soil. It did not, however, afford enough peculiarities to merit a long stay, so I proceeded to San Geronimo. At this place, the country has the character of a semi-desert with mesquite and cactus and very little rainfall. This year, however, about a week before my arrival, an especially heavy rain flooded the land for miles. The water ran off quickly, and soon the heat of the sun caused the soil to crack,

forming crevices in all directions, some of them more than three feet deep and so broad that I could thrust my arm into them. Much of the life of the surface evidently had been destroyed by the water. I found many hundreds of trap-door spiders' nests but all were deserted and ruined.

The most striking and distinctive character of the fauna at San Geronimo seems to be brilliancy of coloring. Thus the black spider, *Latrodectus mactans*, common all over tropical countries, has here broad coral-red stripes which give it an appearance more red than black. The

E. O. Hovey, Photo., 1906.

ON THE JÁLTEPEC RIVER, ISTHMUS OF TEHUANTEPEC.

black scorpion is replaced by a yellow one, the black and brown tarantula by a species with pink cephalothorax and red-striped abdomen. Specimens of arachnida were abundant, but the number of species was few, so that three days proved time enough to get a representative collection.

My next stop was made at Tonala, Chiapas. This town is in the rainy belt which begins a few miles to the southeast of San Geronimo and extends along the Pacific coast into Guatemala. In the lowland, it was hard to collect, owing to the great amount of water over the ground from the swollen brooks. One trip only was made through the little

ranches on the plain, and the remaining days were spent on the slopes of the hills about 1200 feet above sea level.

Finally I decided to go to Tapachula and the Guatemalan border — although it turned out that I first had two days of good hunting at a rubber plantation, La Zacualpa, on the way to Tapachula. When we reached Tapachula on the evening of Thursday, August 5, the rain was falling in torrents and did not stop even for a moment until Sunday. We wanted to reach the Guatemalan border from Tapachula and return on

E. O. Hovey, Photo., 1906.

ON THE TEHUANTEPEC RIVER.

the same day, the distance being only some forty-eight kilometers on the Pan-American Railroad, but the country was already so flooded that the train proceeded very slowly. At one place it stopped, and a ditch was made to allow the water to run from one side of the track to the other, while an improvised support was constructed for the rails. Meanwhile the rain began to fall again, and when, late in the afternoon, we reached the last station, about one kilometer from the border, the conductor was so afraid of a washout, since the wheels of the cars were already plowing through water in many places, that after only a twenty-minute wait he

started the train on its backward journey. Therefore on Monday, as I heard that the expected washout had occurred and would take some two days for repairs, I went again to the rubber plantation La Zacualpa.

It was no longer possible to collect anywhere in the jungle. In fact the water was so deep that it was impossible to enter within its borders. except in a canoe. There was plenty of life, however, in the high grass among the rubber trees, and in the period of waiting my collection grew to such an extent that I had to get all kinds of odd bottles to hold the specimens. Wednesday we were told that it would take another two days to repair the washout. We remained at Zacualpa. When on Friday, however, we were told that the washout extended over eighty-eight kilometers of the railroad more or less, that several bridges were destroyed and that some eight days would be required to make the necessary repairs, we decided to go to the last station to which the train was running and there to get horses for Pijijiapam.

It rained nearly all day Friday, and we had to spend the night in a railroad car. Next morning we let the horses swim across the river, while we carried the baggage over a bridge, the approach to which on both sides of the river was dangerous owing to the fact that the track had no support, the ties hanging in the air suspended from the rails. Furthermore, a great amount of brush and logs had been caught by the piers in the middle of the bridge so that it bent perceptibly under the pressure. We walked over this bridge one at a time, then resaddled our horses and leaving the railroad started on the "Camina Reale," or "Royal Highway." Fortunately the rain did not begin until about two o'clock or else we should not have been able to cross some of the rivers that we encountered. In the dry season these are mere brooks, but now some of them were about one hundred yards wide and three to four feet deep and so rapid that many a time we hesitated before urging the horses to enter. During the three days of our ride, we crossed twelve such rivers and more than double that number of smaller streams.

It would be hard to imagine a worse road than this "Royal Highway," the only road between Tapachula and Tonala. In some places it was many yards wide, in others it narrowed to a mere path. It ran through the woods and the fields of ranches which were separated from each other by miles of beautiful jungle. Where the path was narrow, the water from the recent rains was often two feet deep. In other places the road was so muddy that we had to lift our feet to the horse's neck

to prevent their plowing long distances through the soft clay. Along one part of the road a great number of trees had been uprooted by some storm and lay across our way. To ride around the free ends of these trees necessitated in many cases the use of the machete and in consequence much delay.

It is not surprising that, under such circumstances, we were able to make no more than four kilometers an hour on the average. With our baggage soaked because of repeated crossings of rivers and ourselves so wet that we no longer minded the rain, we arrived on the evening of the first day at Mapastepec where we stopped over night. On the next day we reached Margarita and stopped at a Mexican ranch, sleeping in hammocks in the same wet clothing of our journey. On the third day we reached Pijijiapam and were glad to remain over night in the railroad station. We found that the bridge over the Pijijiapam River had been swept away the twisted rails being washed ashore some hundred yards farther down the stream. The following day we crossed this river, then paid off our guides and waited for a train that was hourly expected. It did not come till late in the evening and proved to be a mere work train, but we were grateful to get under cover from the rain and spent the night in a box car, reaching Tonala early in the morning.

These days of ride through the jungle were, perhaps, the most interesting part of the whole journey. Not only could we study many recent foot-prints of wild animals, but also we were accompanied for a long time by a crowd of monkeys. They showed no fear and chattered, played and swung from tree to tree looking down on us with curiosity. Red and green parrots were also present in great numbers, and their cry in the evening reminded me forcibly of the distant calling of the European crows, when in large flocks they are looking for a night's shelter. The insect life was abundant and apparently the same as at Tonala and Zacualpa, but it was impossible to do any collecting under the conditions.

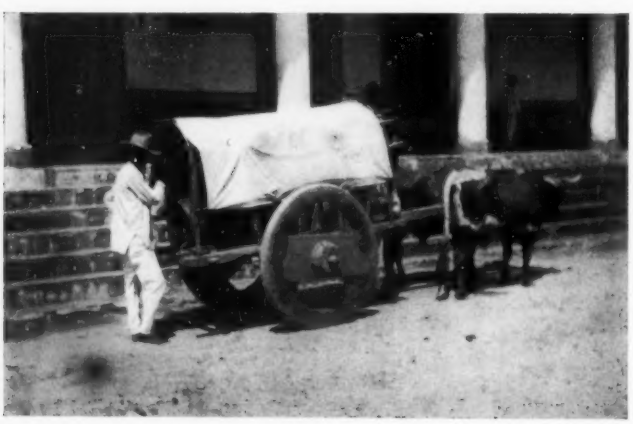
To my great disappointment my collection of spiders from Zacualpa and Tapachula was considerably damaged during this trip. At first I tied the basket containing the jars around my neck and held it on the saddle in front, but after fording the first river, I appreciated the fact that in case the horse slipped, I should not be able to swim ashore with that weight on my neck, so thereafter I fastened my basket to the pack horse. The constant shaking resulted in rubbing many specimens to powder,

and as though that were not misfortune enough, the horse fell on its back in a ditch and broke some of the most valuable vials. Finally, so many had been the mishaps that I felt grateful to see that the entire collection was not ruined.

The rest of the journey had fewer unexpected incidents. I did some collecting at Cordova and in the vicinity of Mexico City. On the way to Texas a flood at Monterey made it impossible to reach San Antonio through Laredo, so a westerly detour was made by way of Eagle Pass. At Austin, I spent a week collecting under very difficult conditions, for the weather had been dry so long that the soil was desiccated and cracked and the insects and spiders were hidden deep in the ground. Professor Paterson of the University of Texas and Professor Brown of the Pease School accompanied me on several of these excursions and most courteously helped in the collecting.

As may be easily imagined, the work of the trip was considerably impeded by the heavy rains and floods which turned the forests of the lowlands into swamps and lakes. With all that, however, the net result of the expedition was large. The collections consist not only of some 2000 specimens of spiders, scorpions and other arachnids but also of more than 400 vials containing many specimens each of myriapods and insects. To this list must be added a few specimens of amphibians and reptiles and a small collection consisting of nineteen Mexican snakes given to me by Mr. Olmstead of Mexico City for presentation to the Museum.

ALEXANDER PETRUNKEVITCH.



E. O. Hovey, Photo., 1906.
TEHUANA TRANSPORTATION

MUSEUM NEWS NOTES.

AT the regular meeting of the Board of Trustees, held on November 8, Dr. James Douglas was elected a member of the Board. Prince Ludwig Salvator was elected a Life Member of the Museum on account of the valuable gift of books noted in the last number of the Journal; Mr. R. R. Cornell was made a Life Member on account of important gifts of the heads of big game and Dr. Hugh M. Smith was elected to Life Membership on account of many services rendered and courtesies extended to the Museum.

IN addition to the gifts already reported in the Journal the following important donations were announced at the Trustees' meeting: A collection of types of North American spiders, received from Dr. Thomas H. Montgomery; one hundred books on angling, from Miss Grace H. Dodge; an atlas of hand-painted plates of Brazilian flowers, from Mr. Anson W. Hard; two hundred volumes on microscopy, from Mr. William G. DeWitt; a head-dress from Abyssinia, from Dr. U. S. Kahn.

SINCE our last issue the following persons have been elected to membership in the Museum: Patrons, MESSRS. JAMES DOUGLAS and GEORGE J. GOULD; Life Members, MESSRS. S. B. CHAPIN, R. R. CORNELL, WILLIAM R. CRAIG, THOS. DE WITT CUYLER, WM. T. DAVIS, LEWIS L. DELAFIELD, A. F. ESTABROOK, ALESSANDRO FABBRI, CHILDS FRICK, JOHN HUBBARD, M. R. JACOBUS, GOODHUE LIVINGSTON, JAMES MCLEAN, EDWARD C. MOORE, JR., VICTOR MORAWETZ, DUDLEY OLCOTT, 2D, J. SANFORD SALTUS, PRINZEN UND HERRN ERZHERZOG LUDWIG SALVATOR, EDWARD SHEARSON, FRANCIS SKINNER, BYAM K. STEVENS, FREDERICK STURGES, F. W. VANDERBILT and HENRY R. WALCOTT, DR. HUGH M. SMITH and MMES. EMMONS BLAINE and SIDNEY WEBSTER; Sustaining Members, MESSRS. H. D. BABCOCK, EDWARD S. HARKNESS, MORTIMER L. SCHIFF, GRANT B. SCHLEY and DELOS O. WICKHAM and MRS. D. C. BLAIR; and Annual Members, MESSRS. JOSEPH A. BLAKE, ALBERT CALMAN, J. B. FRANCIS HERRESHOFF, CARY T. HUTCHINSON, HARRY LA MONTAGUE, JAMES LAUGHLIN, JR., CHARLES L. LEONORI, FRANK J. LOGAN, PHILIP M. LYDIG, J. M. MCCARTHY, WM. MCDONALD CHARLES MAC DONALD, MARVIN H. MEAD, HENRY H. MELVILLE, TRUMAN H. NEWBERRY, DUDLEY OLCOTT, GEO. CARD PEASE, VERYL

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THE annual autumn exhibition of the Horticultural Society of New York was held at the Museum from the evening of November 3 to 7 inclusive and was attended by 30,734 visitors. The exhibit was broader in scope than that of last year and was more effectively displayed, being installed in the foyer and the adjacent halls.

DURING the past summer, Dr. Edmund Otis Hovey of the Department of Geology visited some of the iron and copper mines of the Upper Peninsula of Michigan and secured valuable and interesting specimens for our collections illustrating economic geology. Through the kindness of the Oliver Mining Company, its noted hematite mines at Ishpeming were studied in detail and characteristic specimens secured. Through the courtesy of Dr. Alexander Agassiz, President of the Calumet and Hecla Mining Company, a complete series of specimens was collected illustrating the occurrence of native copper in the celebrated mines of that company at Calumet. Through the courtesy of Mr. F. W. Denton, the mines at Painsdale were visited and characteristic specimens were secured.

DR. LOUIS HUSSAKOF, Assistant Curator of Fossil Fishes, recently returned from a five months' trip to Europe. He spent most of his time studying the collections of living and fossil fishes in the leading museums; among others, the Royal Scottish Museum, the British Museum, the Musée d'Histoire Naturelle of Paris and the Berlin Museum. Considerable attention was given to the methods employed in the exhibition and installation of specimens. The last two weeks of the trip were spent in studying and collecting living fishes at the Stazione Zoologica, Naples. Many valuable scientific data were obtained for future publication.

DURING the past summer collecting in the Eocene deposits of Wyoming for the Department of Vertebrate Palæontology was continued by Mr. Walter Granger. His party was four months in the field and devoted its attention principally to the exposures of the Wind River beds of the Lower Eocene formation in the Wind River basin in the central part of the State. This is the formation in which the famous skeleton of the small four-toed horse, Eohippus, was found in 1880 by Professor Cope's collectors. Fossil remains are rare in the Wind River beds and usually are fragmentary and badly preserved. They are desirable, however, because they fill an important place in the Eocene history of North America. The collection obtained this season comprises more than four hundred specimens, representing probably all of the forms previously known to occur in the formation as well as several new ones. It will, therefore, considerably increase our collection illustrating early Eocene life.

MR. BARNUM BROWN of the Department of Vertebrate Palæontology returned early in November from a field season spent in collecting in the Laramie Cretaceous rocks of Montana. Mr. Brown was assisted by Mr. Peter C. Kaisen, and their efforts were richly rewarded by securing the major portion of a ceratopsian skeleton besides parts of three skeletons of a new predentate dinosaur from the Hell Creek horizon. Furthermore, much material was obtained which will be used in mounting a skeleton of the three-horned dinosaur Triceratops.

THERE has been installed in the new accession cases of the Department of Anthropology (Siberian Hall, southwest corner of the ground floor) a selected series of specimens from the material collected by Mr. Alanson Skinner last summer among the Winnebago, Ojibway and Cree Indians, and by Mr. W. C. Orchard among the Penobscot Indians.

THE twenty-seventh annual convention of the American Ornithologists Union is to be held at the Museum Tuesday to Thursday, December 7 to 9, inclusive.

LECTURE ANNOUNCEMENTS.

MEMBERS' COURSE.

The following illustrated lectures remain to be given to Members of the Museum and persons holding complimentary tickets given them by Members.

Thursday evenings at 8.15 o'clock. Doors open at 7:45.

December 2.— Mr. A. Radclyffe Dugmore, "Camera Adventure in the Wilds of Africa."

December 9.— Mr. Donald B. McMillan, "With Peary in the Arctic."

December 16.— Dr. Hugh M. Smith, "The Coast of Brittany and the Industries of the People."

PUPILS' COURSE.

These lectures are open to the pupils of the public schools when accompanied by their teachers and to the children of Members of the Museum on the presentation of Membership tickets.

Lectures begin at 4 P. M.

Wednesday, December 1.— H. I. Smith, "Life Among our Indians."

Friday, December 3.— R. W. Miner, "Animals Helpful to Man."

Monday, December 6.— E. O. Hovey, "Mining Industries of the United States."

Wednesday, December 8.— F. E. Lutz, "Animals Injurious to Man."

Friday, December 10.— Louis Hussakof, "Travels in South America."

PEOPLE'S COURSE.

Given in coöperation with the City Department of Education.

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

The last three of a course of eleven lectures by Dr. William L. Estabrook on inorganic chemistry, illustrated by experiments.

December 4.— "Carbon Dioxide and Ventilation."

December 11.— "The Atmosphere."

December 18.— "Combustion and the Flame."

Tuesday evenings at 8:15 o'clock. Doors open at 7:30. Lectures illustrated with stereopticon views.

December 7.— Mr. George Newton Cross, "The White Hills."

December 14.— Mr. George Newton Cross, "City of Washington."

Children are not admitted to the lectures of the People's Course, except on presentation of a Museum Member's Card.

LEGAL HOLIDAY COURSE.

Fully illustrated. Open free to the public. No tickets required. Doors open at 2:45, lectures begin at 3:15 o'clock.

Thanksgiving Day, November 25, 1909. CHARLES H. TOWNSEND, "The Fiji Islanders and Other People of the South Seas."

Christmas Day, December 25, 1909. ALANSON SKINNER, "By Canoe to Hudson Bay."

New Year's Day, January 1, 1910. ROY W. MINER, "Sea Animals of Our Shores."

Washington's Birthday, February 22, 1910. EDMUND OTIS HOVEY, "Some American Mining Regions."

Particularly those producing Coal, Iron, Copper, Gold and Silver.

MEETINGS OF SOCIETIES.

Public meetings of the New York Academy of Sciences and Affiliated Societies are held at the Museum according to the following schedule:

On Monday evenings, The New York Academy of Sciences:

First Mondays, Section of Geology and Mineralogy;
Second Mondays, Section of Biology;
Third Mondays, Section of Astronomy, Physics and Chemistry;
Fourth Mondays, Section of Anthropology and Psychology.

On Tuesday evenings, as announced:

The Linnæan Society of New York;
The New York Entomological Society;
The Torrey Botanical Club.

On Wednesdays, as announced:

The Horticultural Society of New York;
The New York Mineralogical Club.

On Friday evenings, as announced:

The New York Microscopical Society.

The programmes of the meetings of the respective organizations are published in the weekly *Bulletin* of the New York Academy of Sciences and sent to the members of the several societies. Members of the Museum on making request of the Director will be provided with the *Bulletin* as issued.

The American Museum Journal

EDMUND OTIS HOVEY, *Editor.*
MARY CYNTHIA DICKERSON, *Associate Editor.*

FRANK M. CHAPMAN,
LOUIS P. GRATACAP,
WILLIAM K. GREGORY, } *Advisory Board.*

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